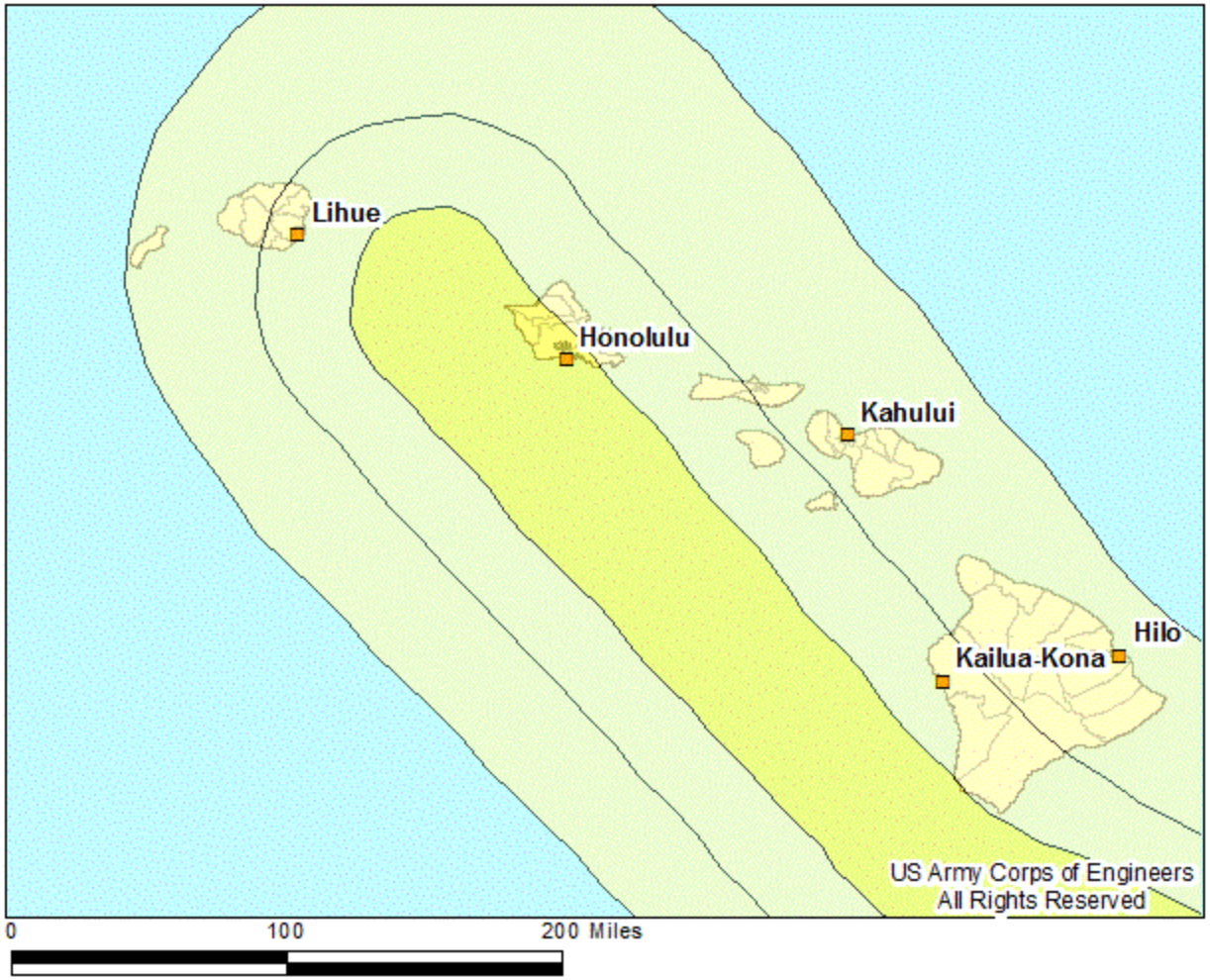
US Army Corps of Engineers

Hurricane Ana Projected Damage Areas

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Post Landfall Projected Damage Areas

This model is based on a Category 1 storm making landfall south of Big Island.

Projected Damage Areas

- CAT 0-type damage
- CAT 1-type damage
- CAT 2-type damage
- CAT 3-type damage
- CAT 4-type damage
- CAT 5-type damage

Information provided on this page displays a projected or actual Category 1 storm making landfall south of Big Island. These projections are based on information from the CPHC (0700 EDT 10/15/2014) forecast and extrapolated by LRL staff to represent a landfall condition that has either occurred or may occur in the near future.

* Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

Hurricane Ana Projected Damage Areas

Generated By:
CAM, USACE Modeling Team
0730 EDT 10/15/2014

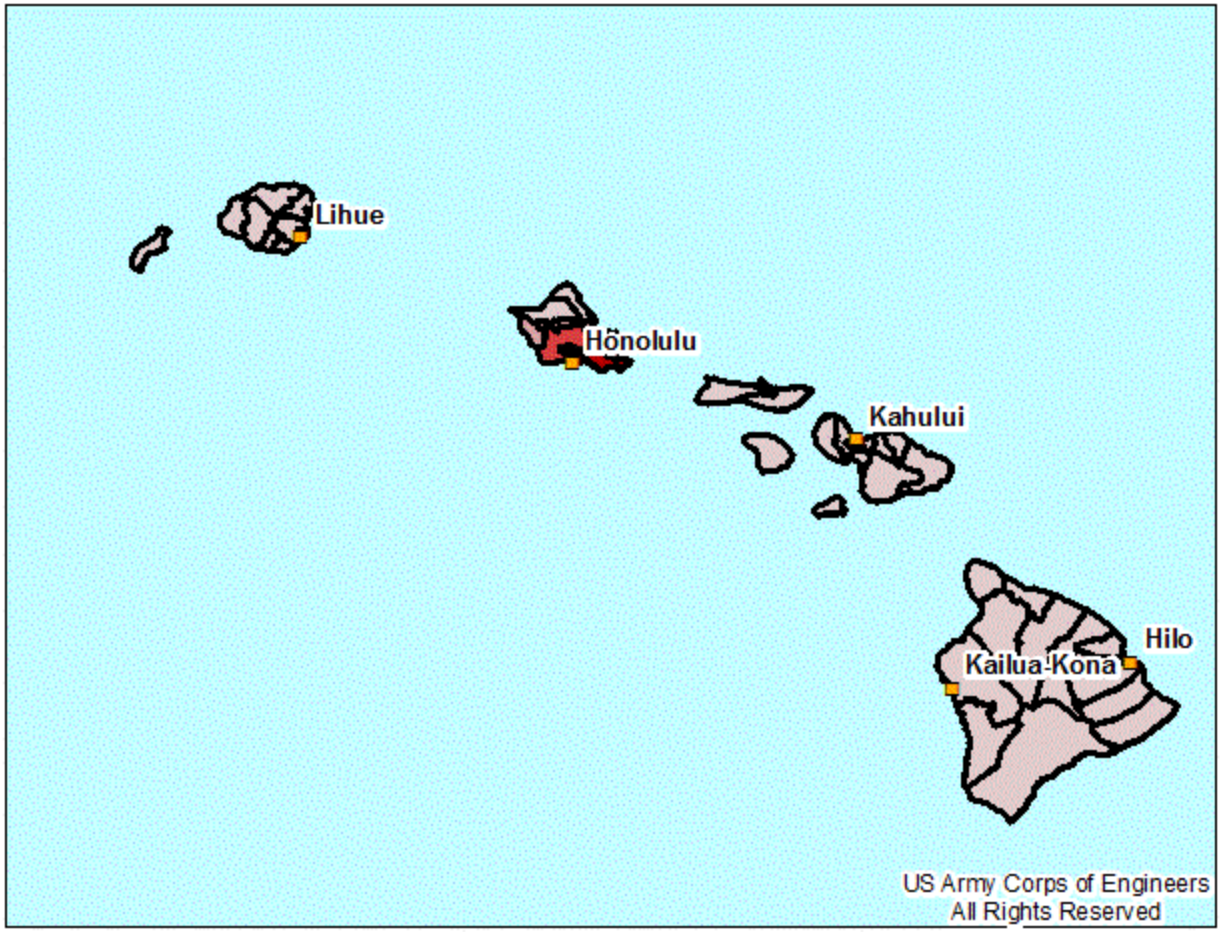
Sources:
HURREVAC
SimSuite

US Army Corps of Engineers

Hurricane Ana Debris Model

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Post Landfall Debris Model Results

HAWAII - 3,425,000 Yards

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

Debris

- < 100,000 cubic yards
- 100,000 - 249,999 cubic yards
- 250,000 - 499,999 cubic yards
- 500,000 - 999,999 cubic yards
- >1,000,000 cubic yards

Information provided on this page displays a Category 1 storm making landfall south of Big Island. These projections are based on information from the CPHC (0700 EDT 10/15/2014) forecast. The amount of debris forecasted is possible total volume, not necessarily the volume that may need to be removed with Federal funds, but does not include volume that may be covered by private insurance. Debris volume may include storm surge generated debris.

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esb@usace.army.mil

Hurricane Ana Debris Model

Generated By:
CAM, USACE Modeling Team
@ 0730 EDT 10/15/2014

Sources:
HURREVAC
SimSuite

US Army Corps of Engineers

Hurricane Ana Debris Model

Landfall Expected In About 72 Hours

For Planning Purposes Only!

Island	Yards per Island	Geographic Unit	Yards per Geographic Unit
HAWAII		EWA - BIG	956,000
		HAMAKUA - NORTH	4,000
		HAMAKUA - SOUTH	2,000
		HANA	2,000
		HANALEI	9,000
		HONOLULU - BIG	1,558,000
		KALAWAO	< 1,000
		KAU	10,000
		KAWAIHAU - EAST	14,000
		KAWAIHAU - WEST	20,000
		KOLOA - EAST	10,000
		KOLOA - WEST	12,000
		KOOLAULOA	26,000
		KOOLAUPOKO	195,000
		LAHAINA	17,000
		LANAI	6,000
		LIHUE - EAST	10,000
		LIHUE - WEST	11,000
		MAKAWAO - NORTHEAST	9,000
		MAKAWAO - NORTHWEST	16,000
		MAKAWAO - SOUTH	12,000
		MOLOKAI - EAST	5,000
		MOLOKAI - WEST	4,000
		NIHAU	< 1,000
		NORTH HILO	2,000
		NORTH KOHALA	5,000
		NORTH KONA	54,000
		PUNA - NORTH	21,000
		PUNA - SOUTH	8,000
		SOUTH HILO - 1	45,000
		SOUTH HILO - 2	5,000
HAWAII (continued)		SOUTH KOHALA	12,000
		SOUTH KONA	16,000
		WAHIAWA	118,000
		WAIALUA	42,000
		WAIANAE	117,000
		WAILUKU - 1	24,000
		WAILUKU - 2	< 1,000
		WAILUKU - 3	< 1,000
		WAILUKU - 4	18,000
		WAILUKU - 5	18,000
		WAILUKU - 6	3,000
		WAIMEA - EAST	4,000
		WAIMEA - WEST	5,000
HAWAII	3,425,000		

The amount of debris forecasted is possible total volume, not necessarily the volume that may need to be removed with Federal funds, but does not include volume that may be covered by private insurance. Debris volume may include storm surge generated debris.

Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

Source: US Army Corps of Engineers, All Rights Reserved

Hurricane Ana Debris Model

Generated By:
CAM, USACE Modeling Team
@ 0730 EDT 10/15/2014

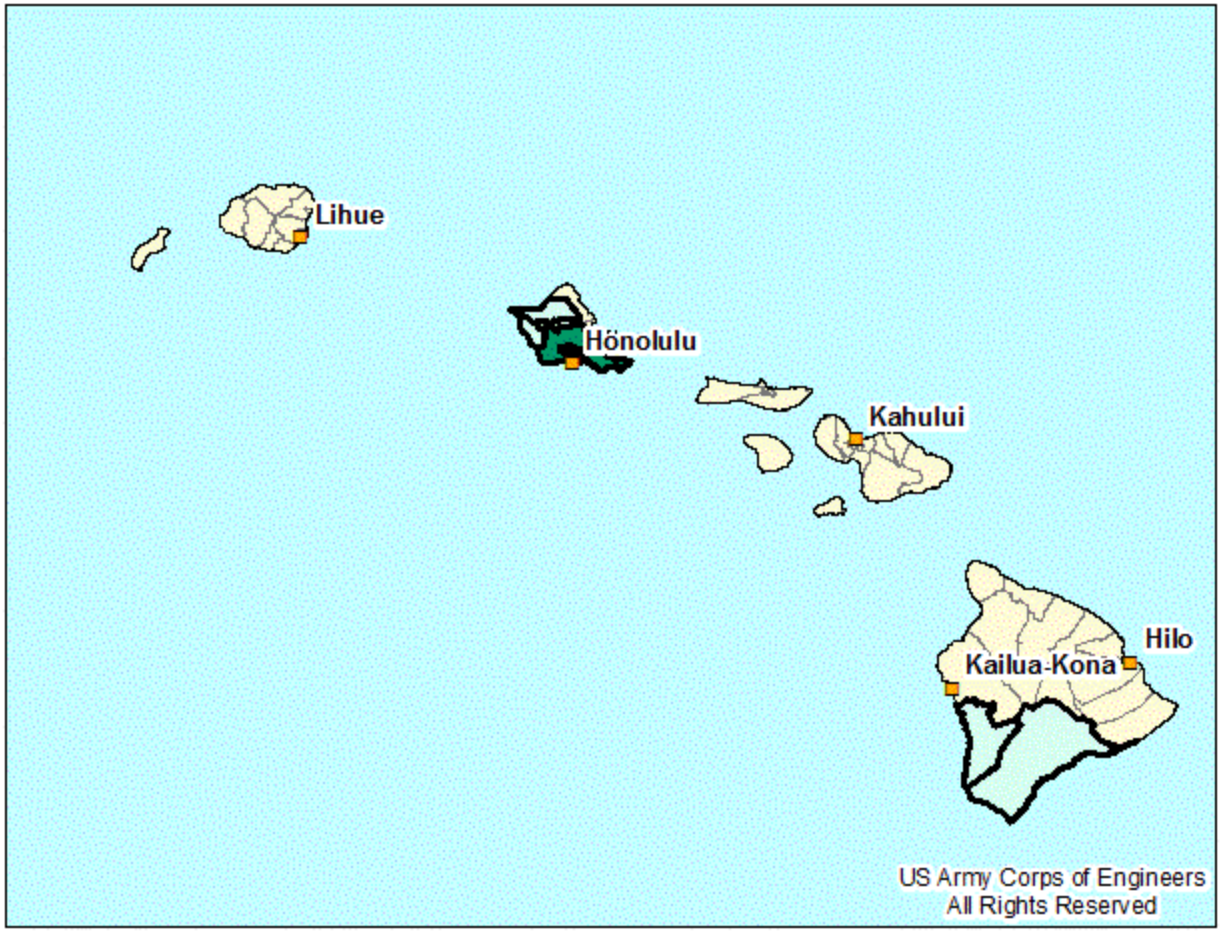
Sources:
HURREVAC
SimSuite

US Army Corps of Engineers

Hurricane Ana Commodities Model

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Post Landfall Water Model Results

Day One / Day Two / Day Three
HAWAII - 58 Truckloads

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

Commodities

- < 5 Trucks Each
- 5 - 10 Trucks Each
- 11 - 20 Trucks Each
- 21 - 40 Trucks Each
- > 40 Trucks Each

Information provided on this page displays a Category 1 storm making landfall south of Big Island. These projections are based on information from the CPHC ***(0700 EDT 10/15/2014)*** forecast. The amount of commodities forecasted is based on Mission Guide Book requirements and SME input. The graphic represents daily needs with a ramp-up in the distribution system – three days for Points of Distribution (PODs) to be fully in place and operational. Volume shown is for each commodity – water and ice. Commodity need may be supplied by multiple agencies and/or sources.

* Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

Hurricane Ana Commodities Model	
Generated By: CAM, USACE Modeling Team @ 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 4 of 23

US Army Corps of Engineers

Hurricane Ana Commodities Model

Landfall Expected In About 72 Hours

For Planning Purposes Only!

Island	Truckloads per Island	Geographic Unit	Truckloads per Geographic Unit
HAWAII		EWA - BIG	23
		HONOLULU - BIG	25
		KAU	1
		SOUTH KONA	1
		WAHIAWA	3
		WAIALUA	1
		WAIANAE	4
HAWAII	58		

Source: US Army Corps of Engineers, All Rights Reserved

The amount of commodities forecasted is based on Mission Guide Book requirements and SME input and the above table indicates suggested daily needs based on full deployment of a commodities distribution system. Volume shown is for each commodity – water and ice. Commodity need may be supplied by multiple agencies and/or sources.

* Details about this model may be obtained at http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx or contact the USACE Modeling Team at dll-cewr-esf3@usace.army.mil

Hurricane Ana Commodities Model

Generated By:
CAM, USACE Modeling Team
0730 EDT 10/15/2014

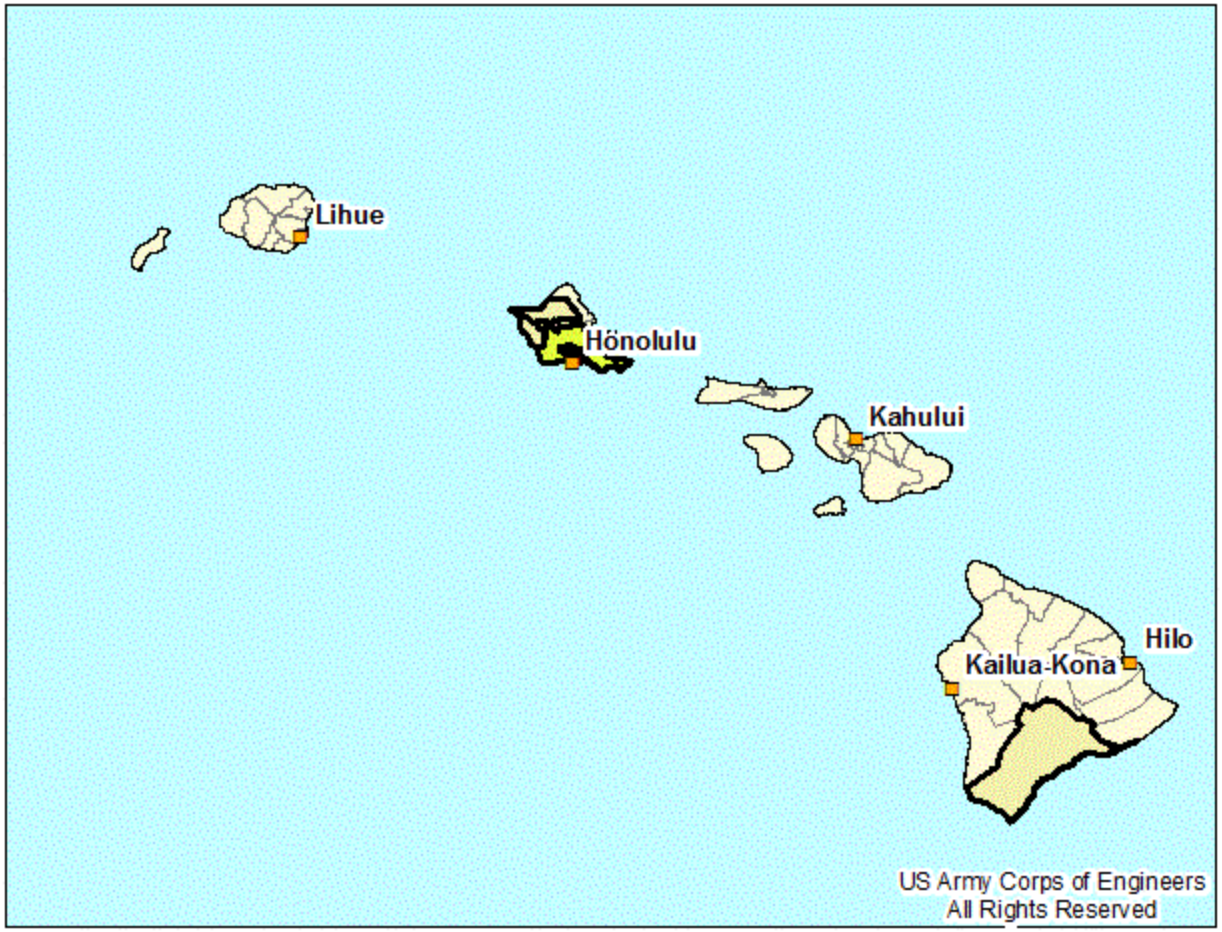
Sources:
HURREVAC
SimSuite

US Army Corps of Engineers

Hurricane Ana Temporary Roofing Model

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Post Landfall Temporary Roofing Model Results

HAWAII - 6,500

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

Temporary Roofing

- < 2,000 units
- 2,000 - 3,999 units
- 4,000 - 5,999 units
- 6,000 - 9,999 units
- > 10,000 units

Information provided on this page displays a Category 1 storm making landfall south of Big Island. These projections are based on information from the CPHC (0700 EDT 10/15/2014) forecast. Temporary roofing is based on 2.7% in CAT 1.

* Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

Hurricane Ana Roofing Model	
Generated By: CAM, USACE Modeling Team 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 6 of 23

US Army Corps of Engineers

Hurricane Ana Temporary Roofing Model

Landfall Expected In About 72 Hours

For Planning Purposes Only!

Island	House Units per Island	Geographic Unit	House Units per Geographic Unit
HAWAII		EWA - BIG	2,300
		HONOLULU - BIG	3,300
		KAU	< 100
		WAHIAWA	300
		WAIALUA	200
		WAIANAE	400
HAWAII	6,500		

Temporary roofing is based on 2.7% in CAT 1.

* Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

Source: US Army Corps of Engineers, All Rights Reserved

Hurricane Ana Roofing Model

Generated By:
CAM, USACE Modeling Team
0730 EDT 10/15/2014

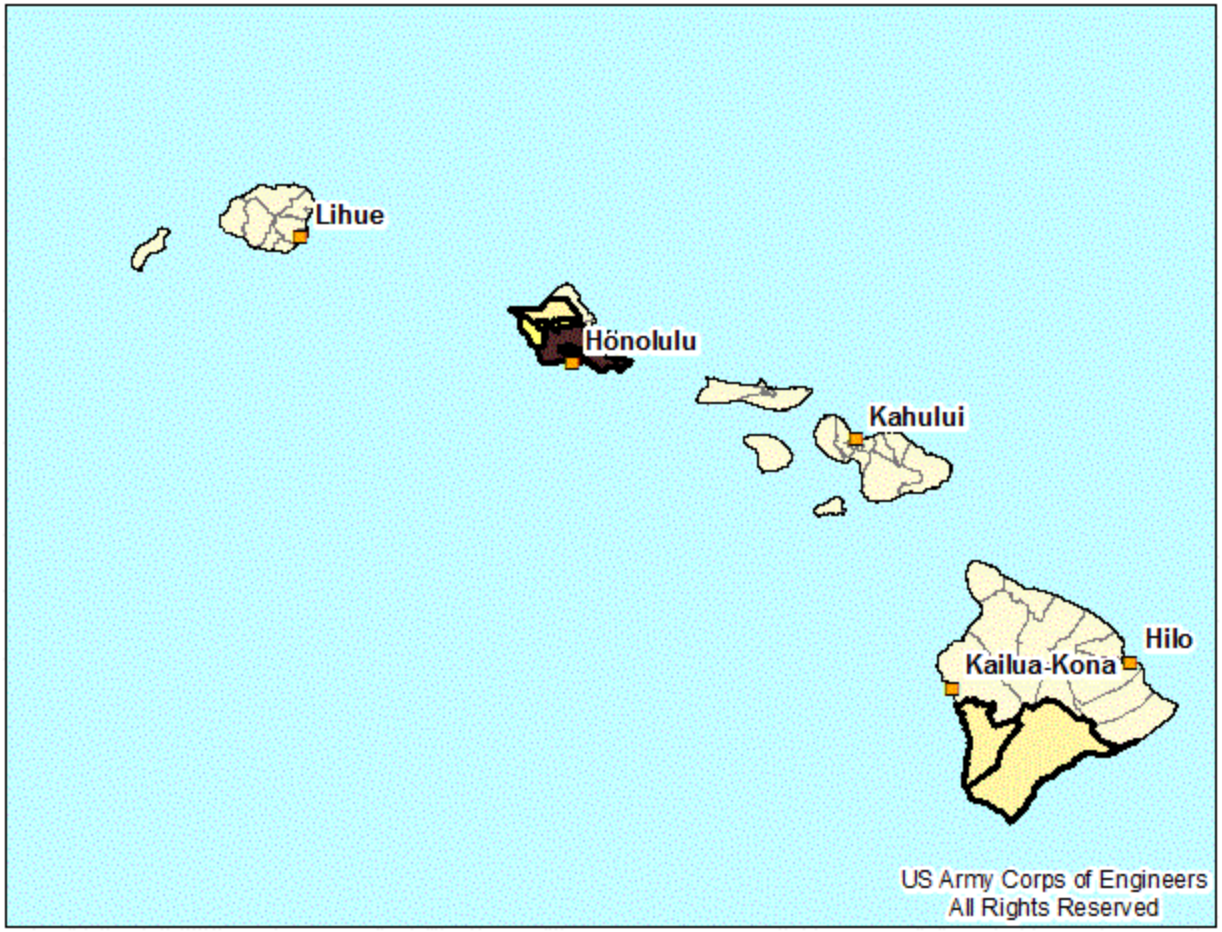
Sources:
HURREVAC
SimSuite

US Army Corps of Engineers

Hurricane Ana Population Model

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Post Landfall Population Model Results

HAWAII - 688,000

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

Population

- < 25,000 persons
- 25,000 - 99,999 persons
- 100,000 - 174,999 persons
- 175,000 - 249,999 persons
- > 250,000 persons

Information provided on this page displays a Category 1 storm. These projections are based on information from the CPHC (0700 EDT 10/15/2014) forecast. The numbers of persons included in this model output are those that would be included within estimated hurricane force winds (Census 2010 values adjusted to July 2011 values).

* Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

Hurricane Ana Population Model	
Generated By: CAM, USACE Modeling Team 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	

US Army Corps of Engineers

Hurricane Ana Population Model

Landfall Expected In About 72 Hours

For Planning Purposes Only!

Island	Population per Island	Geographic Unit	Population per Geographic Unit
HAWAII		EWA - BIG	285,000
		HONOLULU - BIG	306,000
		KAU	< 1,000
		SOUTH KONA	< 1,000
		WAHIAWA	38,000
		WAIALUA	12,000
		WAIANAE	47,000
HAWAII	688,000		

The number of persons estimated to be within the hurricane force winds comes from Census 2010 values adjusted to July 2011 values.

* Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

Source: US Army Corps of Engineers, All Rights Reserved

Hurricane Ana Population Model

Generated By:
CAM, USACE Modeling Team
0730 EDT 10/15/2014

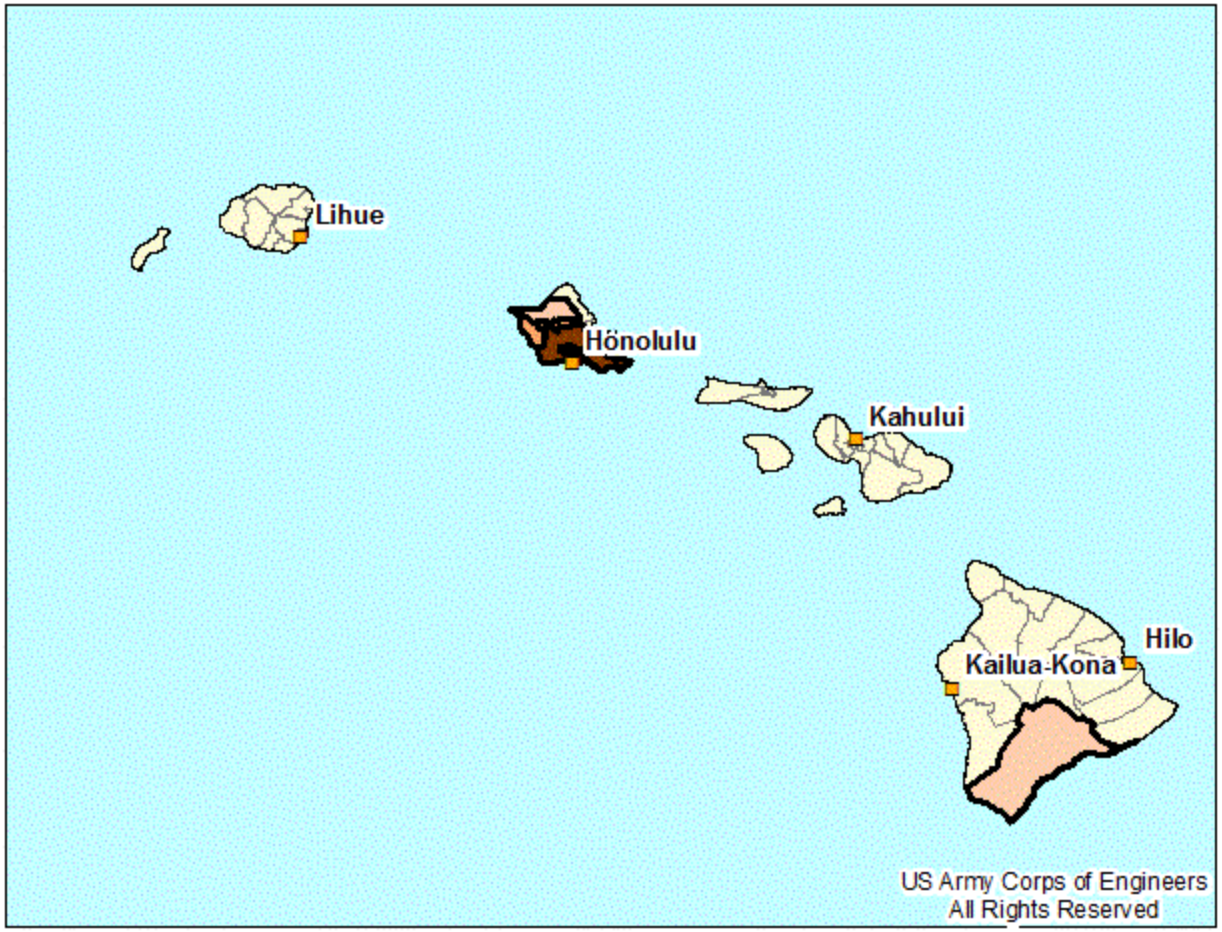
Sources:
HURREVAC
SimSuite

US Army Corps of Engineers

Hurricane Ana Households Model

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Post Landfall Households Model Results

HAWAII - 231,000

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

Households

- < 7,500 households
- 7,500 - 14,999 households
- 15,000 - 24,999 households
- 25,000 - 49,999 households
- > 50000 households

Information provided on this page displays a Category 1 storm making landfall south of Big Island. These projections are based on information from the CPHC (0700 EDT 10/15/2014) forecast. The numbers of households included in this model output are those that would be included within estimated hurricane force winds (Census 2010 values adjusted to July 2011 values).

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

Hurricane Ana Households Model

Generated By:
CAM, USACE Modeling Team
@ 0730 EDT 10/15/2014

Sources:
HURREVAC
SimSuite

US Army Corps of Engineers

Hurricane Ana Households Model

Landfall Expected In About 72 Hours

For Planning Purposes Only!

Island	Households per Island	Geographic Unit	Households per Geographic Unit
HAWAII		EWA - BIG	84,000
		HONOLULU - BIG	120,000
		KAU	< 1,000
		WAHIAWA	11,000
		WAIALUA	4,000
		WAIANAE	12,000
HAWAII	231,000		

The number of households estimated to be within the hurricane force winds comes from Census 2010 values adjusted to July 2011 values.

* Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

Source: US Army Corps of Engineers, All Rights Reserved

Hurricane Ana Households Model

Generated By:
CAM, USACE Modeling Team
@ 0730 EDT 10/15/2014

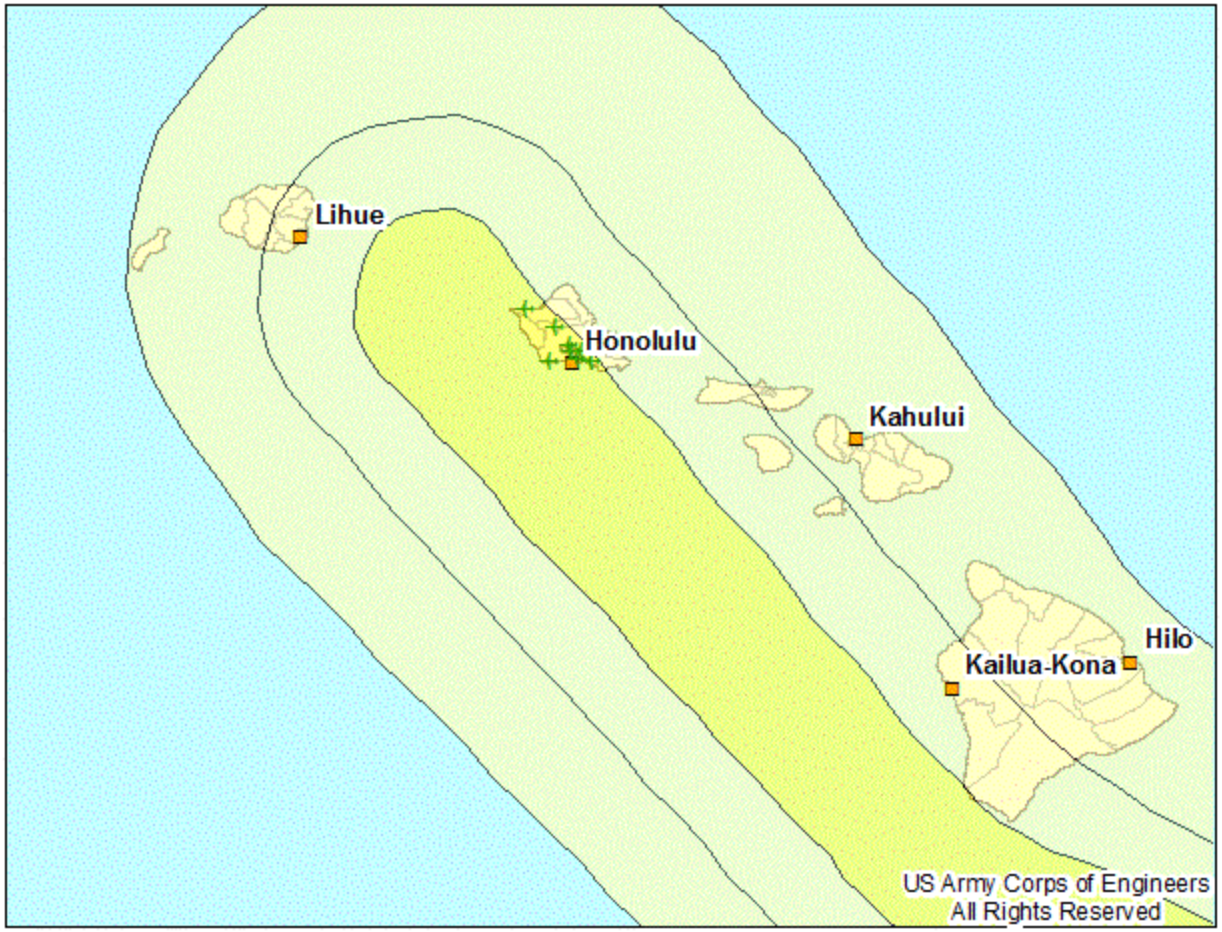
Sources:
HURREVAC
SimSuite

US Army Corps of Engineers

Hurricane Ana Airports

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Most Probable Landfall Airports Inside Hurricane Force Winds

Hawaii - 10

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

Information provided on this page displays a Category 1 storm. These projections are based on information from the CPHC forecast.
The number of airports included in this output are those that would be included within estimated hurricane force winds (data source: HSIP Gold 2013).

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

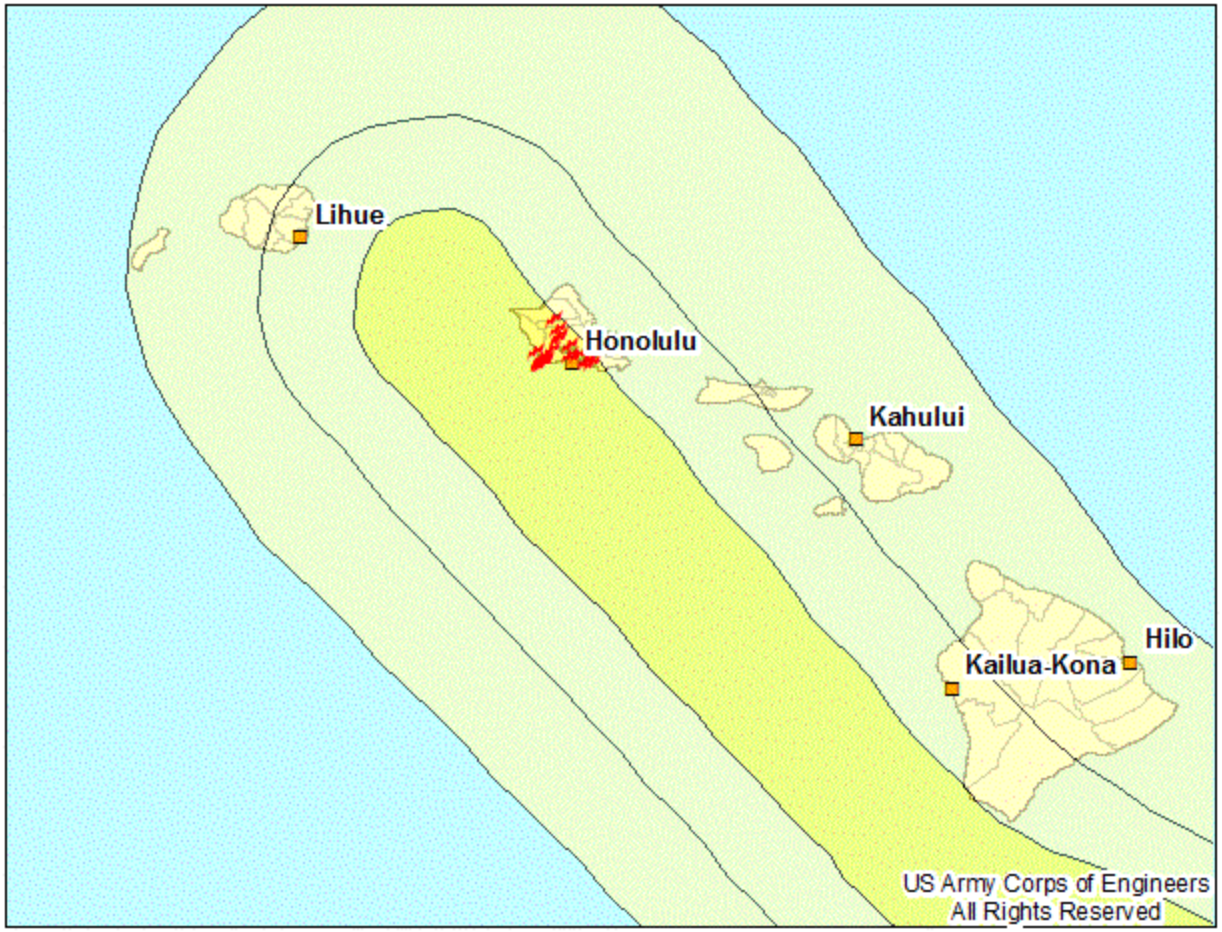
Hurricane Ana Airports	
Generated By: CAM, USACE Modeling Team @ 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 12 of 23

US Army Corps of Engineers

Hurricane Ana Electric Power Plants

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Most Probable Landfall Electric Power Plants Inside Hurricane Force Winds

Hawaii - 25

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

Electric Power Plants

Information provided on this page displays a Category 1 storm. These projections are based on information from the NHC forecast.
The number of airports included in this output are those that would be included within estimated hurricane force winds (data source: HSIP Gold 2013).

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

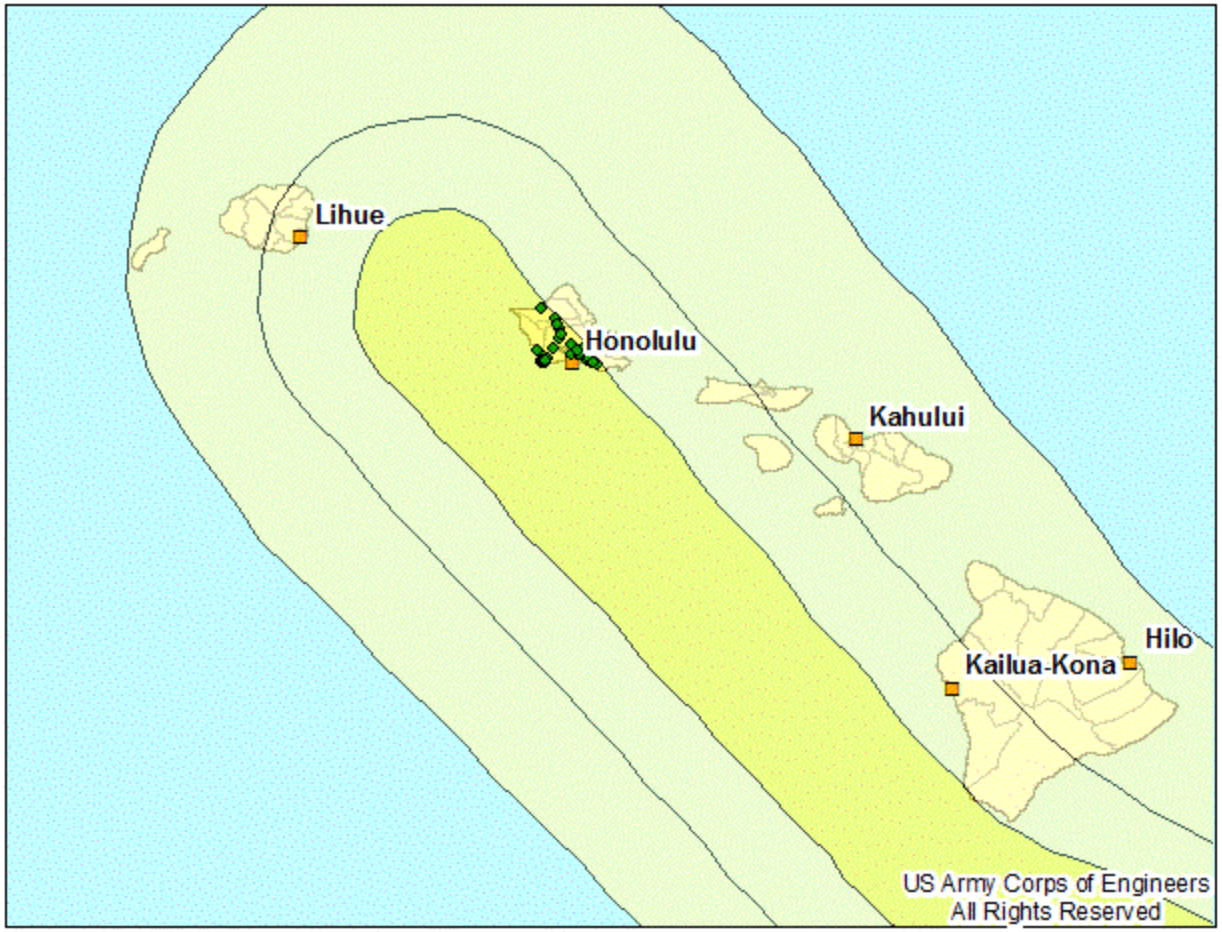
Hurricane Ana Electric Power Plants	
Generated By: CAM, USACE Modeling Team @ 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 13 of 23

US Army Corps of Engineers

Hurricane Ana Electric Substations

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Most Probable Landfall Electric Substations Inside Hurricane Force Winds

Hawaii - 35

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

◆ Electric Substations

Information provided on this page displays a Category 1. These projections are based on information from the CPHC forecast.
The number of airports included in this output are those that would be included within estimated hurricane force winds (data source: HSIP Gold 2013).

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

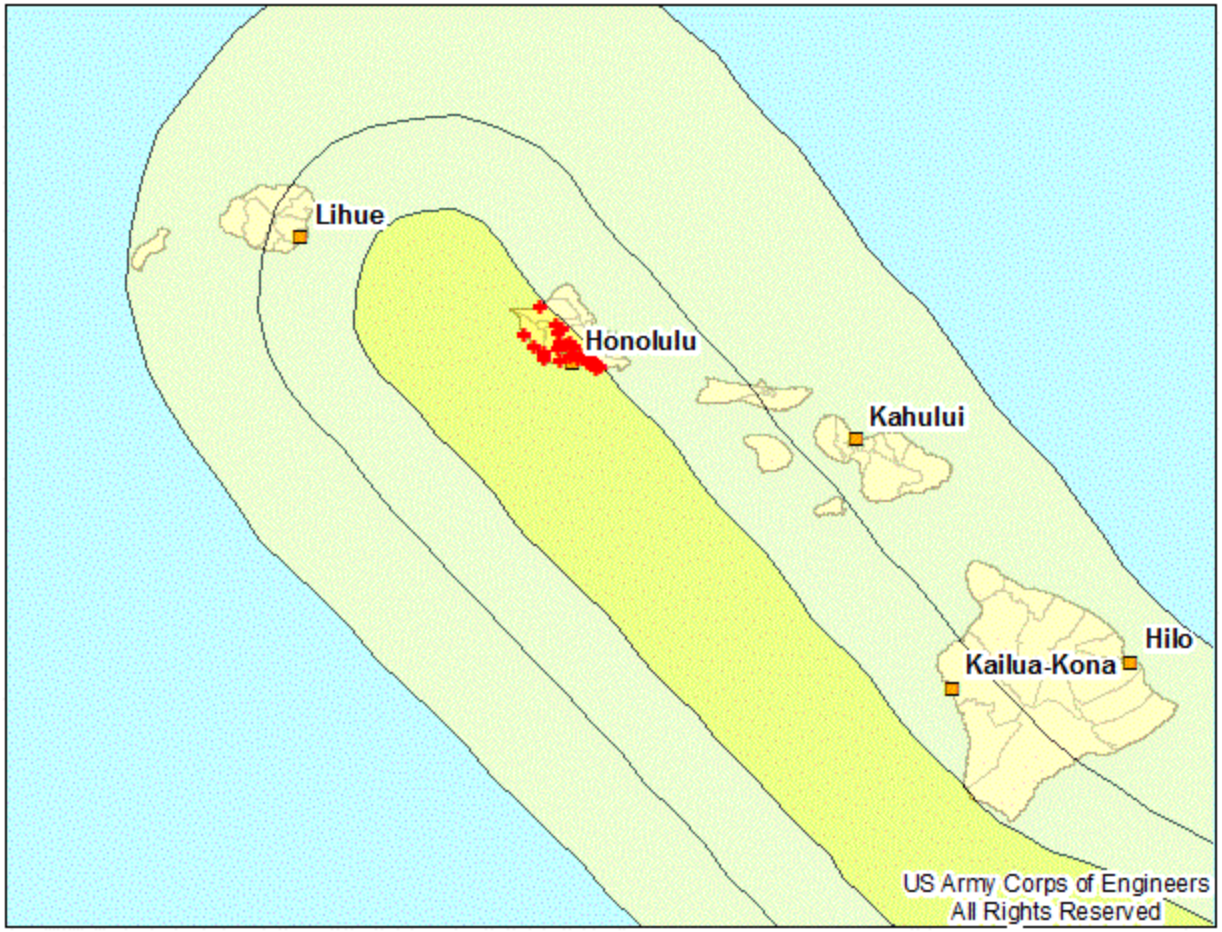
Hurricane Ana Electric Substations	
Generated By: CAM, USACE Modeling Team @ 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 14 of 23

US Army Corps of Engineers

Hurricane Ana Fire Stations

Landfall Expected In About 72 Hours

For Planning Purposes Only!



0 100 200 Miles

Most Probable Landfall Fire Stations Inside Hurricane Force Winds

Hawaii - 31

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

✚ Fire Stations

Information provided on this page displays a Category 1. These projections are based on information from the CPHC forecast.
The number of airports included in this output are those that would be included within estimated hurricane force winds (data source: HSIP Gold 2013).

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

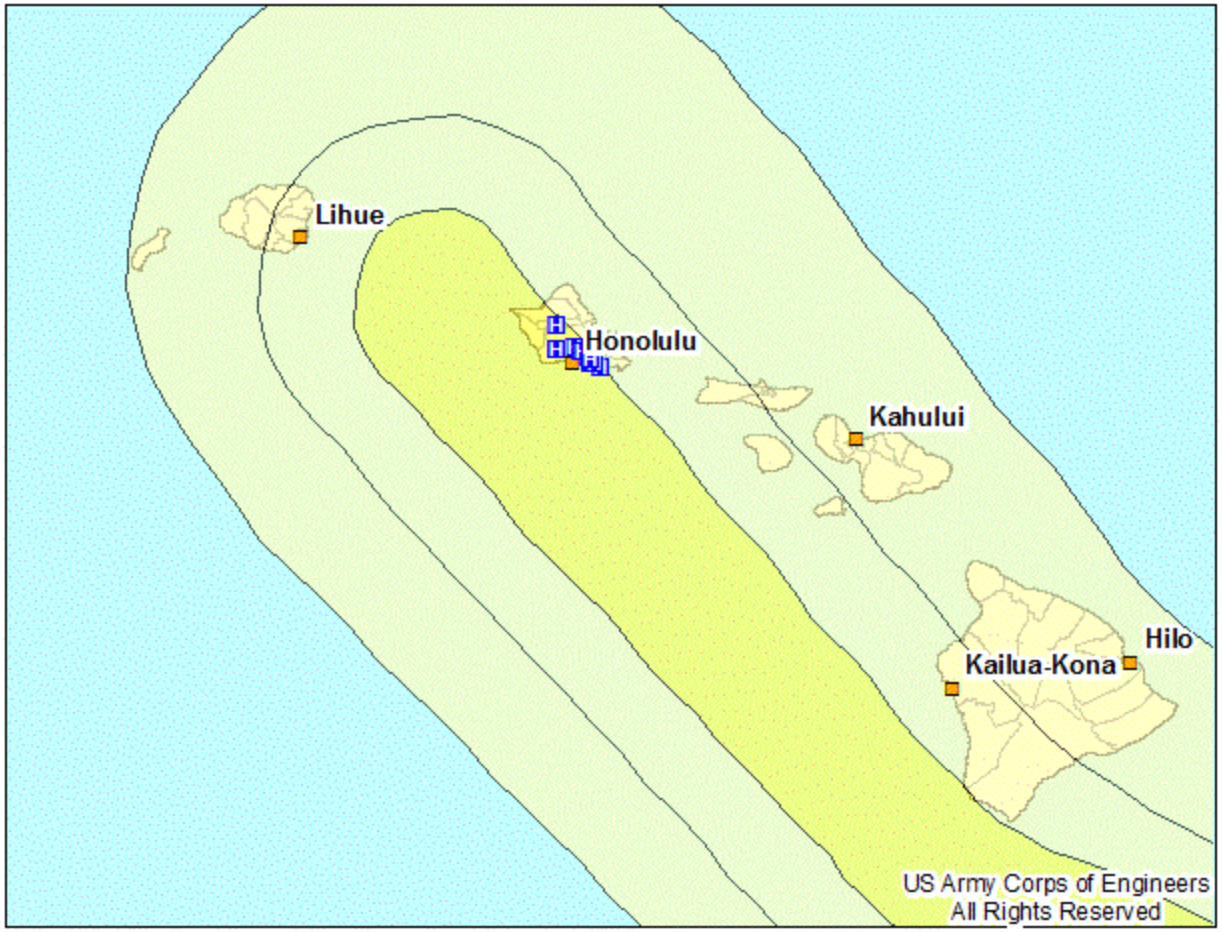
Hurricane Ana Fire Stations	
Generated By: CAM, USACE Modeling Team @ 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 15 of 23

US Army Corps of Engineers

Hurricane Ana Hospitals

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Most Probable Landfall Hospitals Inside Hurricane Force Winds

Hawaii - 15

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

H Hospitals

Information provided on this page displays a Category 1. These projections are based on information from the CPHC forecast.
The number of airports included in this output are those that would be included within estimated hurricane force winds (data source: HSIP Gold 2013).

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

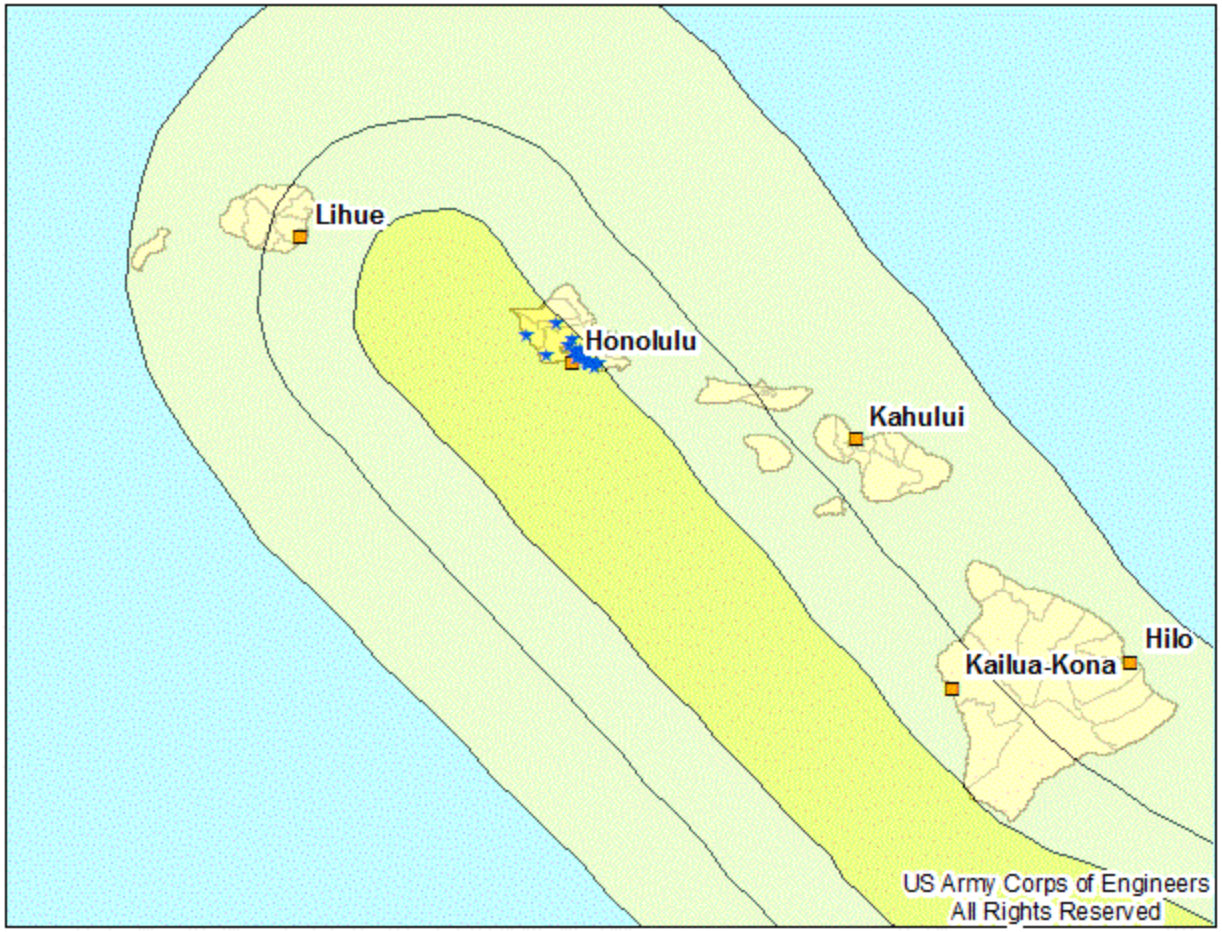
Hurricane Ana Hospitals	
Generated By: CAM, USACE Modeling Team @ 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 16 of 23

US Army Corps of Engineers

Hurricane Ana Law Enforcement

Landfall Expected In About 72 Hours

For Planning Purposes Only!



0 100 200 Miles

★ Law Enforcement

Most Probable Landfall Law Enforcement Inside Hurricane Force Winds

Hawaii - 28

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

Information provided on this page displays a Category 1 storm. These projections are based on information from the CPHC forecast.
The number of airports included in this output are those that would be included within estimated hurricane force winds (data source: HSIP Gold 2013).

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

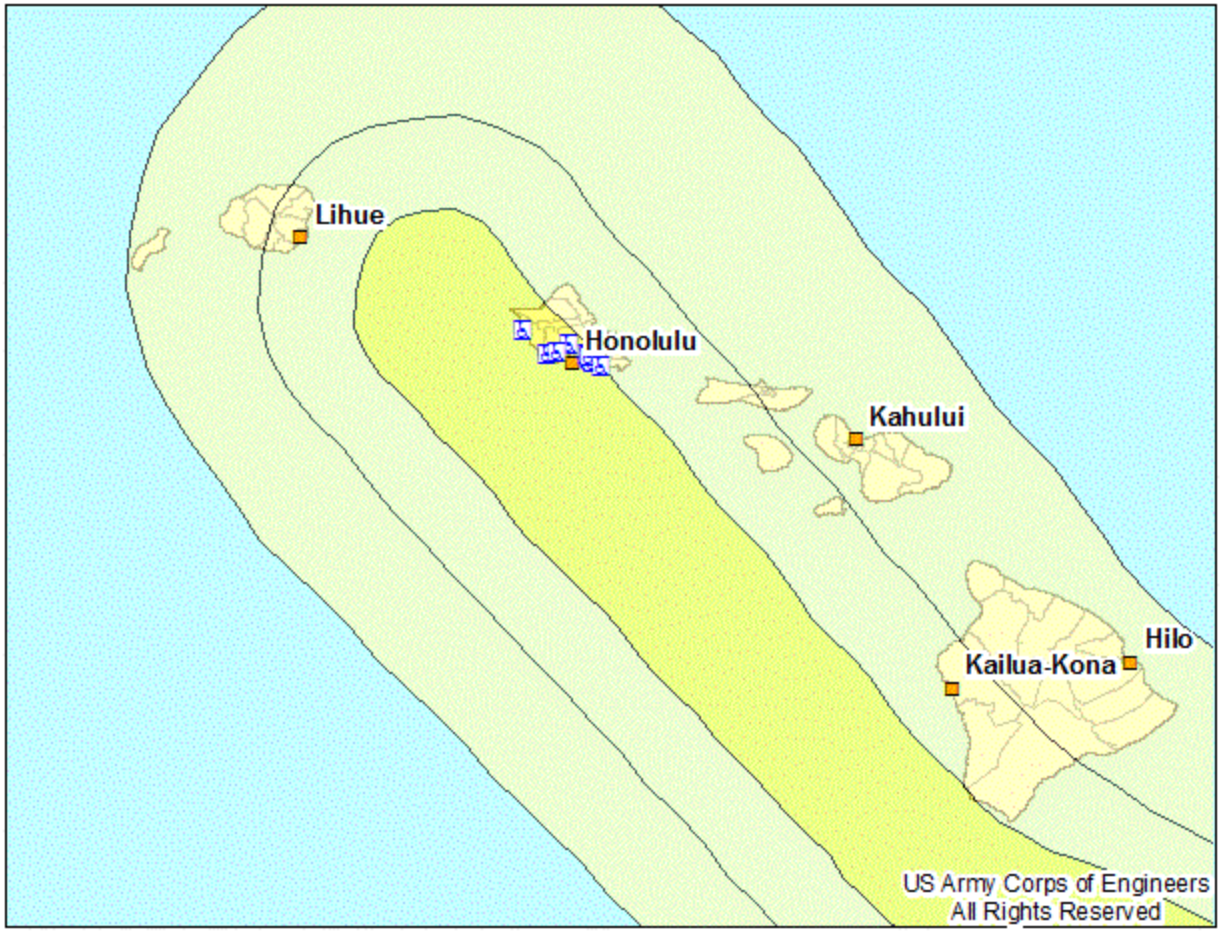
Hurricane Ana Law Enforcement	
Generated By: CAM, USACE Modeling Team @ 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 17 of 23

US Army Corps of Engineers

Hurricane Ana Nursing Homes

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Most Probable Landfall Nursing Homes Inside Hurricane Force Winds

Hawaii - 19

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

Nursing Homes

Information provided on this page displays a Category 1 storm. These projections are based on information from the CPHC forecast.
The number of airports included in this output are those that would be included within estimated hurricane force winds (data source: HSIP Gold 2013).

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/Emergency/Operations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

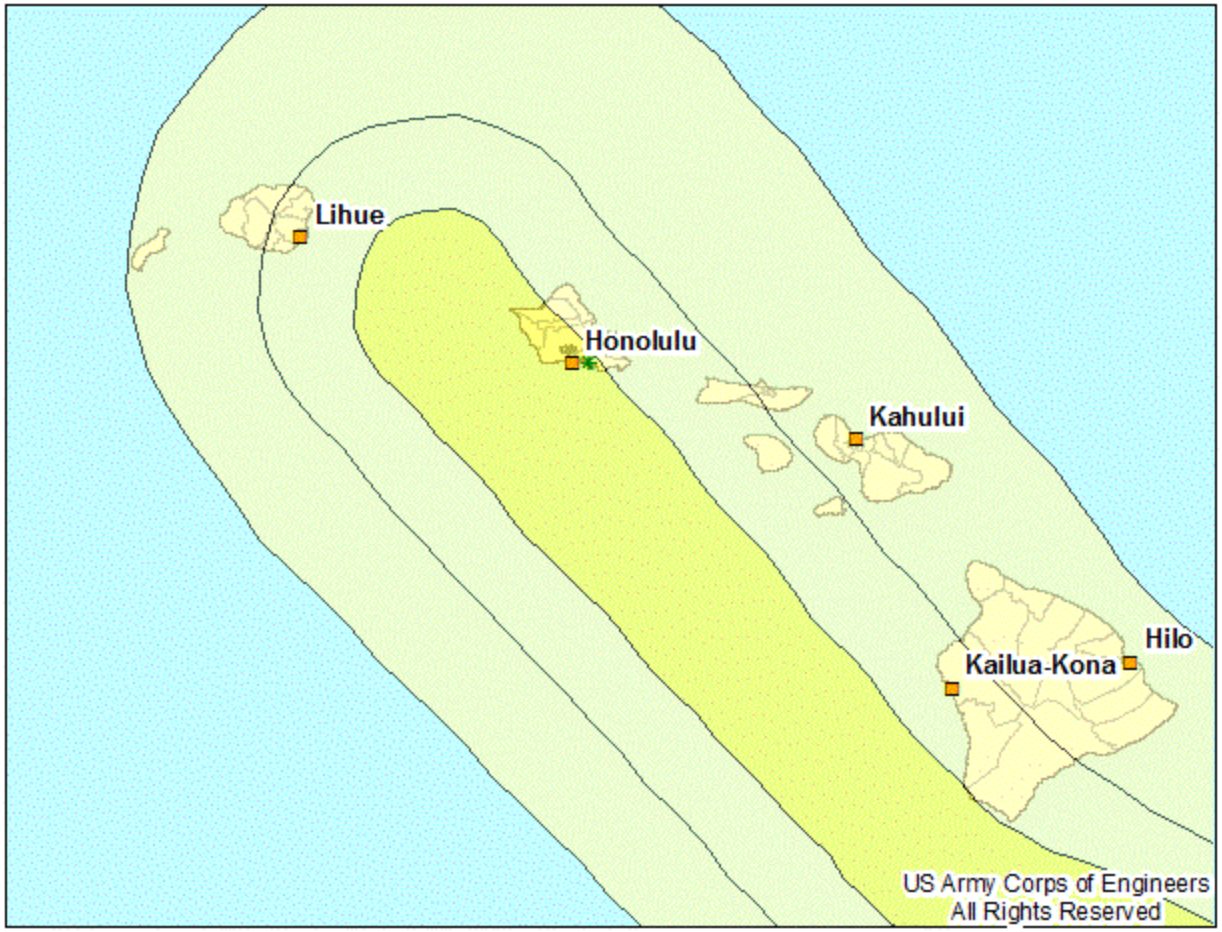
Hurricane Ana Nursing Homes	
Generated By: CAM, USACE Modeling Team @ 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 18 of 23

US Army Corps of Engineers

Hurricane Ana Potable Water

Landfall Expected In About 72 Hours

For Planning Purposes Only!



0 100 200 Miles

* Potable Water

Most Probable Landfall Potable Water Inside Hurricane Force Winds

Hawaii - 1

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

Information provided on this page displays a Category 1 storm. These projections are based on information from the CPHC forecast.
The number of airports included in this output are those that would be included within estimated hurricane force winds (data source: HSIP Gold 2013).

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

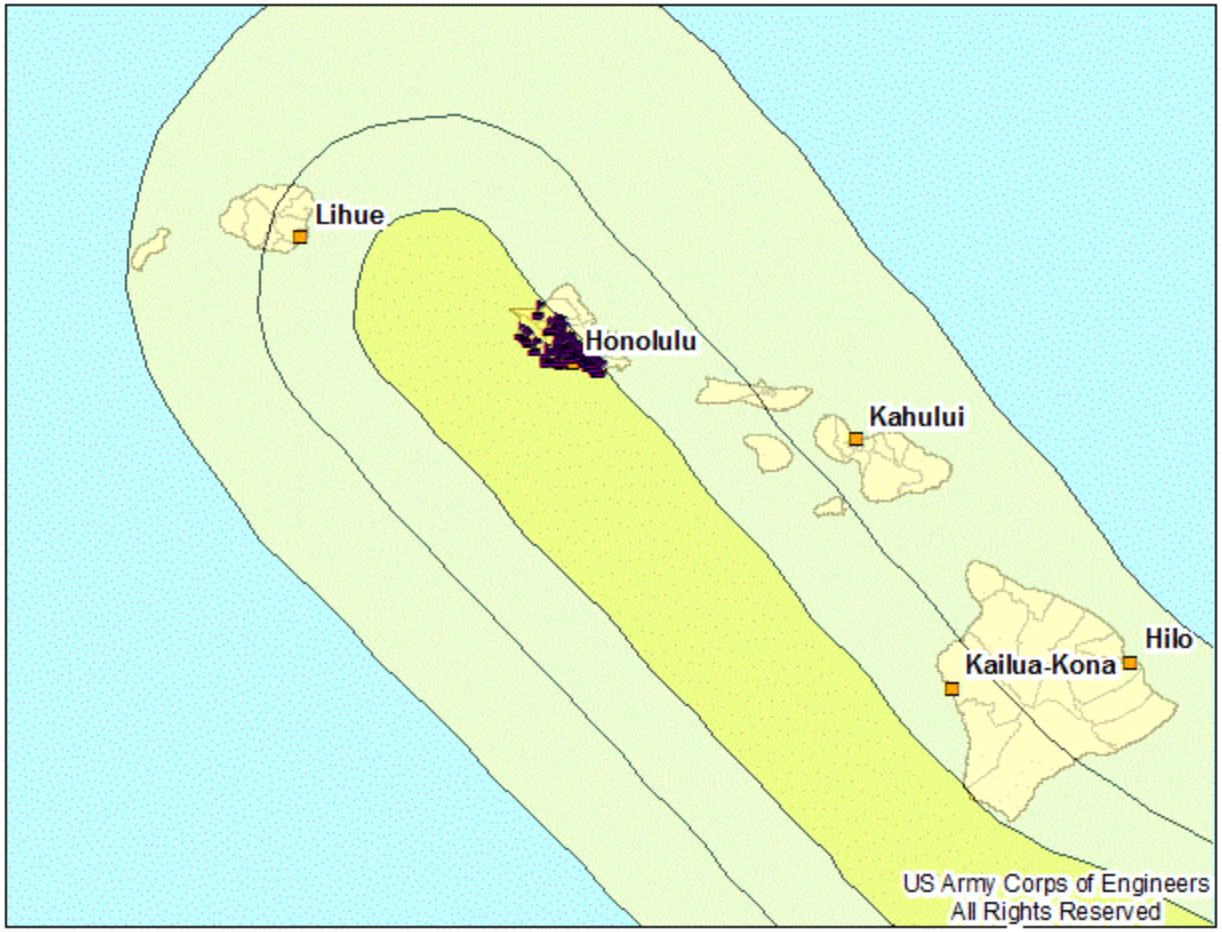
Hurricane Ana Potable Water	
Generated By: CAM, USACE Modeling Team @ 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 19 of 23

US Army Corps of Engineers

Hurricane Ana Schools

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Most Probable Landfall Schools Inside Hurricane Force Winds

Hawaii - 136

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

Schools

Information provided on this page displays a Category 1 storm making landfall. These projections are based on information from the CPHC forecast.
The number of airports included in this output are those that would be included within estimated hurricane force winds (data source: HSIP Gold 2013).

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/Emergency/Operations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

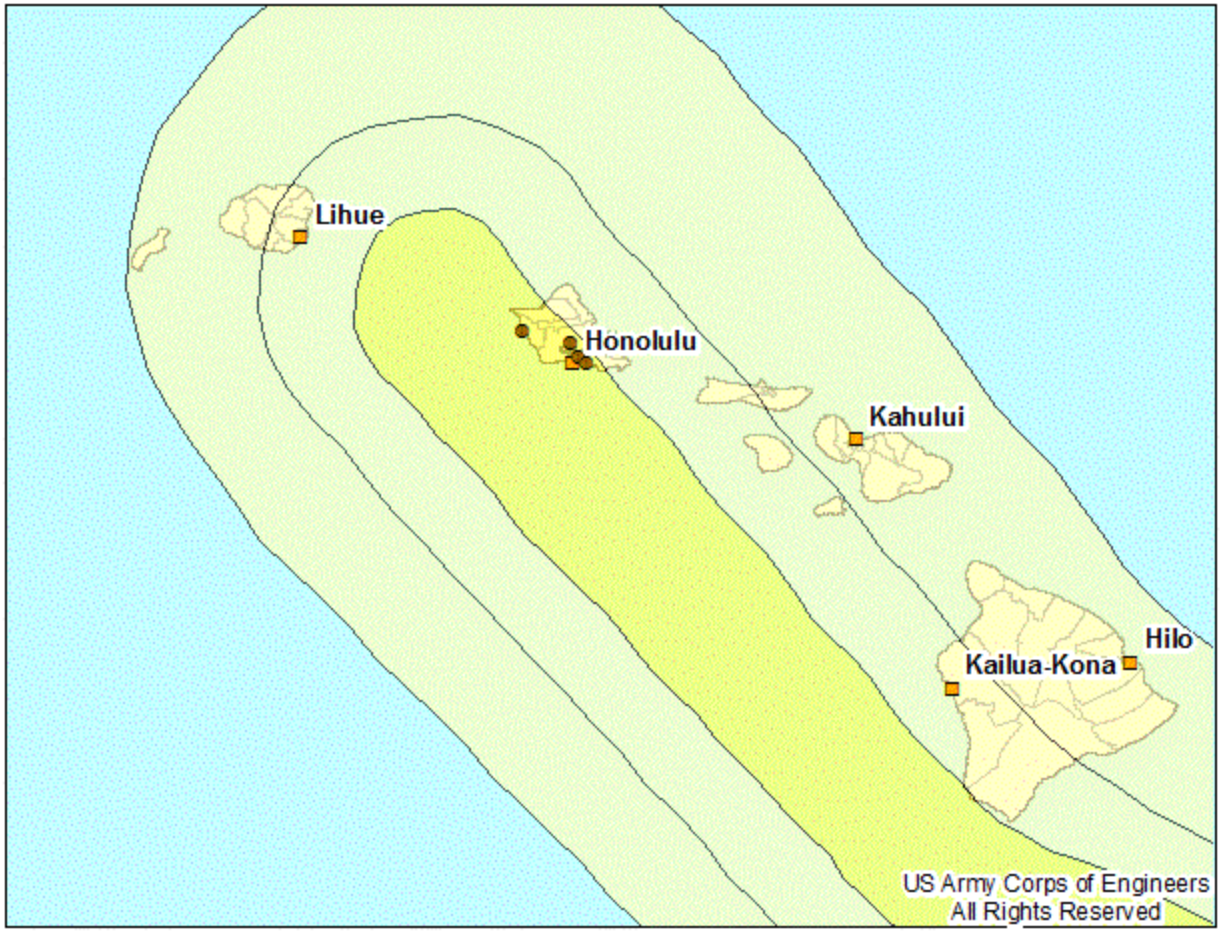
Hurricane Ana Schools	
Generated By: CAM, USACE Modeling Team @ 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 20 of 23

US Army Corps of Engineers

Hurricane Ana Sewage Treatment Plants

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Most Probable Landfall Sewage Treatment Plants Inside Hurricane Force Winds

Hawaii - 4

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

● Sewage Treatment Plants

Information provided on this page displays a Category 1 storm. These projections are based on information from the CPHC forecast.
The number of airports included in this output are those that would be included within estimated hurricane force winds (data source: HSIP Gold 2013).

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

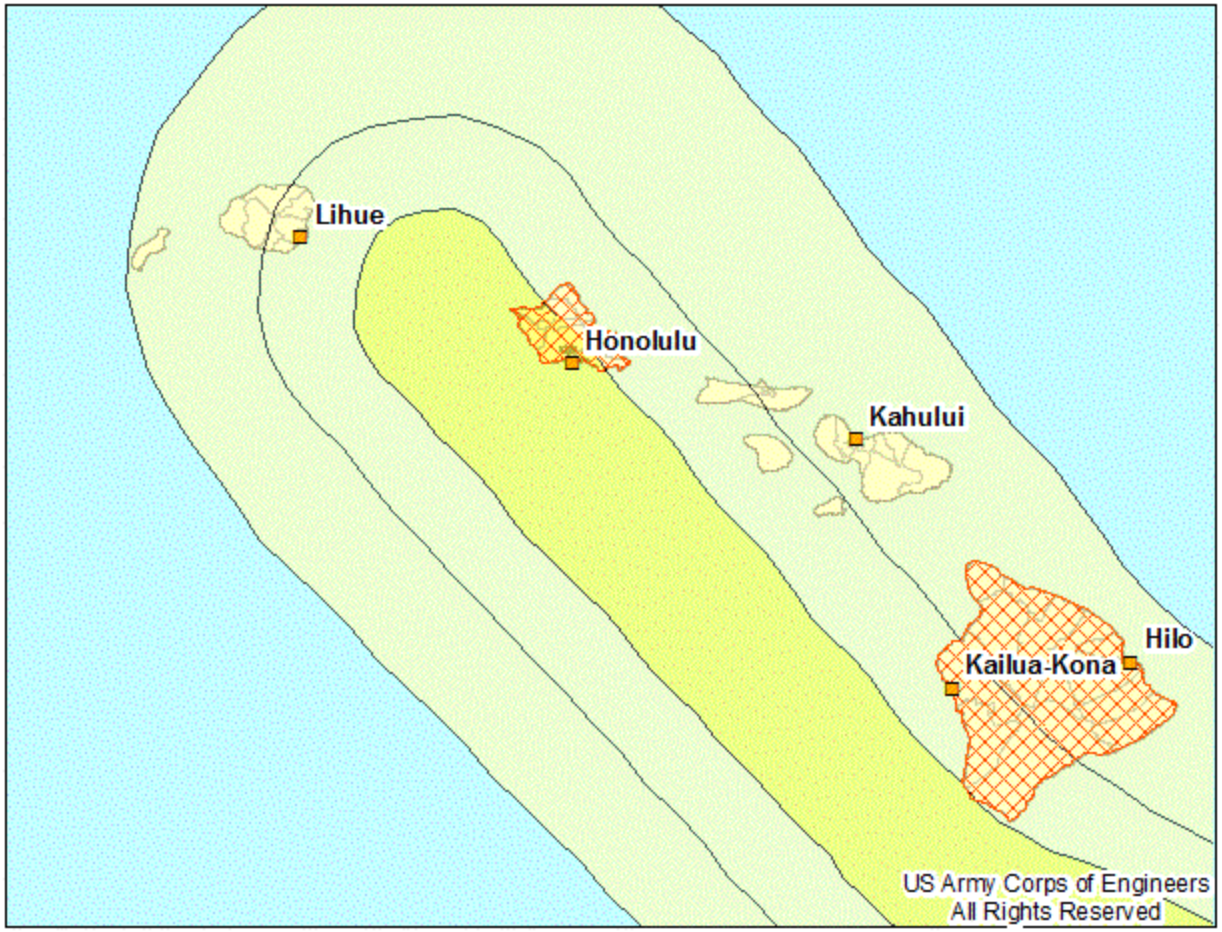
Hurricane Ana Sewage Treatment Plants	
Generated By: CAM, USACE Modeling Team @ 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 21 of 23

US Army Corps of Engineers

Hurricane Ana Electric Service Areas

Landfall Expected In About 72 Hours

For Planning Purposes Only!



Most Probable Landfall Electric Service Areas Inside Hurricane Force Winds

Hawaii - 2

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

Electric Service Areas

Information provided on this page displays a Category 1 storm. These projections are based on information from the CPHC forecast.
The number of airports included in this output are those that would be included within estimated hurricane force winds (data source: HSIP Gold 2013).

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

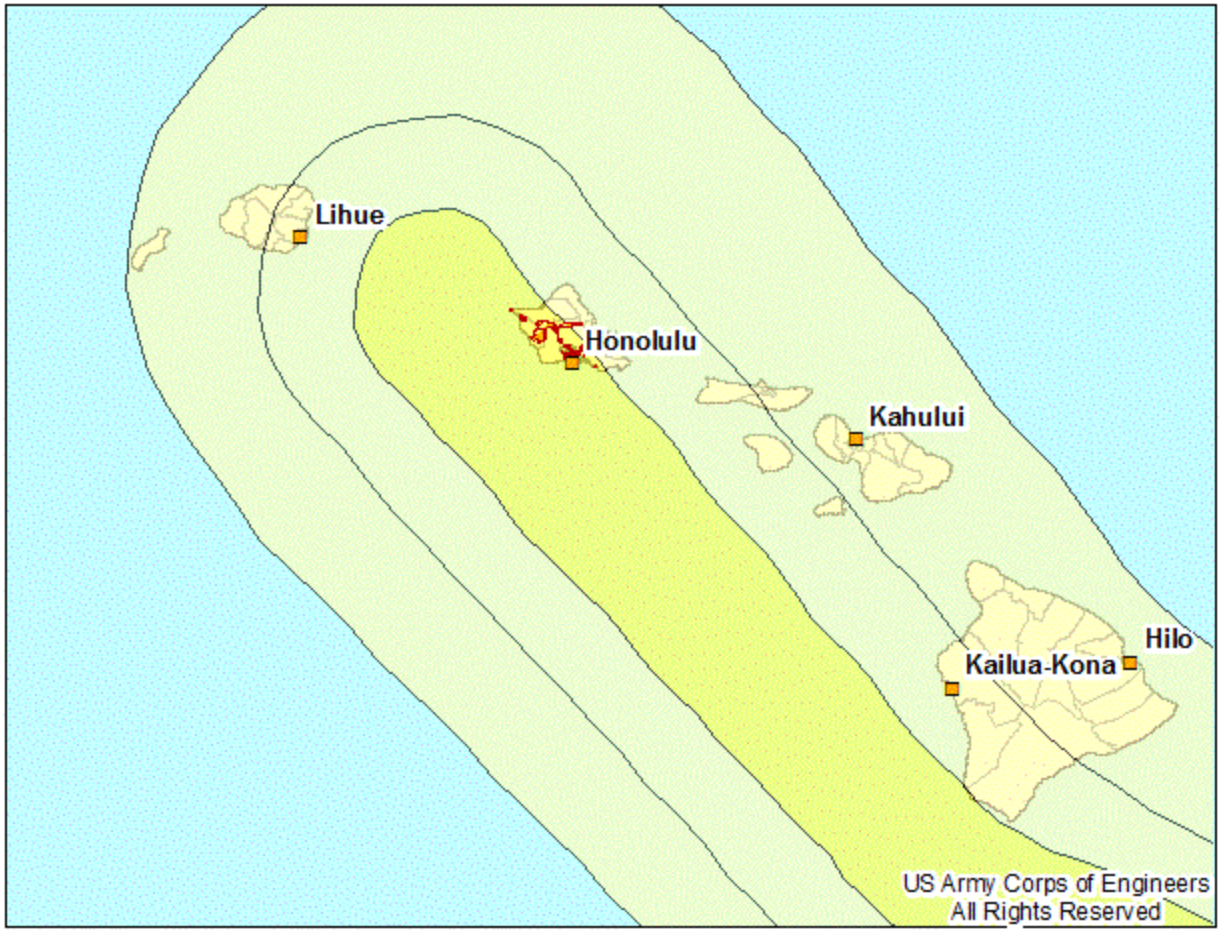
Hurricane Ana Electric Service Areas	
Generated By: CAM, USACE Modeling Team @ 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 22 of 23

US Army Corps of Engineers

Hurricane Ana Military Bases

Landfall Expected In About 72 Hours

For Planning Purposes Only!



0 100 200 Miles

Most Probable Landfall Military Bases Inside Hurricane Force Winds

Hawaii - 25

Model results per Geographic Unit on following page

This model is based on a Category 1 storm making landfall south of Big Island.

Military Bases

Information provided on this page displays a Category 1 storm. These projections are based on information from the CPHC forecast.
The number of airports included in this output are those that would be included within estimated hurricane force winds (data source: HSIP Gold 2013).

*Details about this model may be obtained at
http://www.usace.army.mil/Missions/EmergencyOperations/DisasterImpactModels.aspx
or contact the USACE Modeling Team at dll-ceiwr-esf3@usace.army.mil

Hurricane Ana Military Bases	
Generated By: CAM, USACE Modeling Team @ 0730 EDT 10/15/2014	
Sources: HURREVAC SimSuite	Page 23 of 23